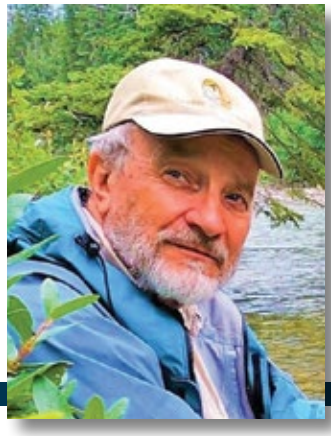
Fixing a Broken Species:
Challenges in the Recovery of Westslope Cutthroat Trout



By Lorne Fitch

My grandfather's pocket watch lies heavy in my palm. On the back, arrayed against the silver of the case, is an embossed golden horseshoe. That horseshoe, slightly raised, is worn nearly through, maybe like the luck it used to imply. Time and luck have both run out for the watch since it is broken and no longer repairable.

Similar to my grandfather's watch, time has run out for some of the few remaining westslope cutthroat trout populations, and it is rapidly running out for others. Threatened is the current term used to express their official status in Alberta. Maybe "extinguished" would be appropriate for some streams. Cutthroat trout are now absent from 94 percent of their historic range. Once there were more cutthroat trout than people in Alberta; now we vastly outnumber the remaining genetically pure fish — those few remaining individuals free from hybridization with introduced species.

Recovery goals, created both provincially and federally, include protecting and expanding the current range of genetically pure populations. Pure is defined as a percentage of genetic material that is true to type, greater, or equal to 99 percent. In other words, the real, unadulterated trout, not mixed with non-native rainbow trout genes. Hybridization with rainbow trout is a particularly vexing problem that started when we began stocking our lakes, rivers, and streams with non-native species for the sake of sportfishing. The evolutionary fate of hybridized populations is unknown, as yet, because it is a paradox; the effect of genetic mixing is believed to reduce fitness, yet despite that belief, hybridization has progressed rapidly.

Photo: Cutthroat trout- Myles Radford

Caption: West slope cutthroat trout (pictured) were once abundant across southwest Alberta but are now absent from 94 percent of their historic range. Photo © M. Radford.

Michael Sullivan, a provincial fish scientist with Alberta Environment and Protected Areas, describes the three horsemen of fisheries apocalypse as "harvest, habitat, and hybridization." Cutthroat trout were easy to catch; too easy. Their declines led to the thought that stocking was necessary and non-native rainbow trout and other trout species were poured into cutthroat waters. Successive waves of industrial, agricultural, and recreational land uses have washed over most of the watersheds containing cutthroat trout. The number of intact watersheds — road free, uncut, and undeveloped — have shrunk like ice cubes on a hot stove. Against this backdrop, provincial fisheries biologists, national parks biologists, conservation groups, and independent biologists are working together on a quest to fix a broken species. A species which we broke.

The first major challenge was an inventory of cutthroat trout populations, with genetic analysis to determine the degree of purity. This was no small task, and information on overlooked populations is still trickling in. Like stock-taking in a store, the inventory of cutthroat trout provided the information to determine status, a prelude to listing it as a species at risk. This is also crucial to development of a recovery strategy. Where cutthroat trout are currently found is vastly outweighed by areas where they are now missing — that fact alone should be providing a sense of urgency for their recovery.

If that task wasn't daunting enough, the next steps for recovery make the work of the basic inventory pale by comparison. It will be critically important to grow the pure population of cutthroat, in as many places as feasible, as quickly as possible, while ensuring existing populations are protected from peril.

So how does one grow a fish population? Unfortunately, there is no cutthroat trout store available to get more. Range expansion is possible when pure trout are moved into a few barren waters upstream of waterfalls. This is population insurance but does not meet a full recovery goal. A primary recovery goal is to return them to much of their previous range, where many streams are now occupied with hybridized trout.

To repopulate those streams requires an abundant supply of pure cutthroat trout and the strategy involves the development of a hatchery broodstock. As David Mayhood, a fisheries researcher with considerable experience with the species, points out, "Westslope cutthroat trout have developed many unique evolutionary nuances throughout their range." This constitutes a resource of genetic and life history diversity.

Creating a brood stock has to respect this feature of the species, as Andreas Luek, a senior fisheries biologist, explained. The inventory of cutthroat waters provided a place to start. The upper Oldman River watershed had connected populations and the best opportunities to tap for broodstock development. Find some spawning cutthroat trout, capture them, strip, and fertilize the eggs, and presto — a brood stock in the making. If only it was that simple.

Cutthroat trout are spring spawners — a time of snowmelt, rainfall, flooding, and often turbid water conditions. Knowing trout are present in a stream is one thing;

West slope cutthroat trout (pictured) were once abundant across southwest Alberta but are now absent from 94 percent of their historic range. Photo © M. Radford.

finding them in a narrow window of time while they are spawning is another. If a needle in a haystack is a challenge to find, imagine the situation faced by fishery biologists with cutthroat trout.

Trout populations in tiny tributaries of the upper Oldman River are small and it is unwise to remove too much of the reproductive potential. One can't rob Peter to pay Paul, so trout eggs from a number of tributaries are amalgamated into the formation of a "composite" broodstock. This required additional genetic testing to determine if all were of pure derivation, ensuring the various populations to be mixed were connected, sharing similar traits, and the individuals were disease-free.

A coordinated effort, spread over several seasons, required up to 12 teams to locate, capture, and secure eggs. This will continue for several more years until a large enough broodstock is assembled for eventual return to streams.

Return of the progeny of broodstock to streams will be done with a technique called remote site incubation, or RSI. The eggs of pure cutthroat trout, from the wild or broodstock, are allowed to develop in a hatchery facility and then are placed into instream RSI units to hatch. The fry then swim out of the units into the stream. As Brian Meagher, the provincial fisheries biologist who has tested the technique, says, "This gives these trout an almost immediate head start in the stream where they will spend their lives." The technique seems to provide a substantial improvement in survival, over nature, almost quadrupling the number of trout that will swim into a new life.

The next steps, like where to put the progeny of the broodstock, have yet to be worked out, but are the most critical in terms of recovery goals. Multiple, overlapping, and sometimes opposing issues arise. Given these challenges, it would be good to take a moment to appreciate the task fisheries biologists have in recovery efforts for cutthroat trout.

Challenges in population restoration include determining what is the critical population size to be able to survive upsets and persist over the long term. Is there capacity in the hatchery for broodstock and for quarantining eggs? The RSI techniques will need to be scaled up to match population recovery goals.

Then will come the thorny question, how to deal with hybridized populations? Can they be swamped with pure-strain fish and slowly improve the genetics? Will some systems require the removal of hybrids before the stocking of pure trout occurs? How will this be achieved? Will it require the use of rotenone, a fish poison, or can it be done with electrofishing? What will be the public receptivity to the use of rotenone and what engagement will be required with stakeholders?

Where it will be impossible to completely remove hybrids, can barriers to upstream movement be installed, to separate populations? What is the overlap with bull trout populations (also Threatened) and recovery actions for that species? How will other species like mountain whitefish be affected?

How will anglers react to temporary losses of angling opportunity and what angling regulations will be required to protect pure populations? How can public and political support be maintained over the long period of time required for recovery efforts?

Habitat restoration of damaged and degraded stream sections will be required as well as work at a watershed scale. Where are the best possibilities for restoration, what is required to accomplish this, and what will this cost? Who will undertake these herculean tasks? Should this have started long before now?

Multiple cumulative effects assessments done in cutthroat watersheds tell a similar and graphic tale — the future of cutthroat (and other native trout) persistence is at risk because of the land-use footprint, which is large and growing. That is the elephant in the room (or in the watershed). Habitat issues from land use are interlinked and cannot be separated from those of harvest and hybridization. Dealing with the fires of harvest and hybridization, getting them under control is essential. Failure to grapple with land use will potentially compromise all the other efforts.

The biggest challenge is to ensure that westslope cutthroat trout population recovery proceeds at a pace faster than losses and that habitats are secured and protected before they disappear. If that doesn't happen, the fate of the species will mirror my grandfather's pocket watch — the hands frozen in place when the time ran out for repairs.

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